

IN THE CLAIMS:

1. (Currently Amended) A method ~~for suppression of interfering co-channel signals, synchronous or asynchronous, in a single antenna interference cancellation (SAIC) receiver (10) by calculating a desired impulse response estimate signal $\hat{h}_{JCE}^{(1)}$~~ , comprising the steps of:

receiving ~~(60)~~ a radio signal ~~(11)~~ by a receiver filter ~~(12)~~ of the SAIC single antenna interference cancellation receiver (10) and providing a filtered waveform signal ~~(y)~~ to a joint channel estimator (40) of a joint channel estimator module ~~(24)~~ of the single antenna interference cancellation SAIC receiver (10);

providing ~~(65)~~ a desired bit decision signal ~~$\hat{a}(1)$~~ to the joint channel estimator module ~~(24)~~; and

computing ~~(72)~~ the a desired impulse response estimate signal ~~$\hat{h}_{JCE}^{(1)}$~~ by the joint channel estimator (40) using the filtered waveform signal ~~(y)~~, the desired bit decision signal, ~~$\hat{a}(1)$~~ and an interfering training sequence signal ~~(37)~~ and an interfering training sequence delay signal ~~(38)~~ generated without prior knowledge of a training sequence of the interfering co-channel signals for suppression of interfering co-channel signals, synchronous or asynchronous, in a single antenna interference cancellation receiver.

2. (Currently Amended) The method of claim 1, after the ~~step of said~~ providing ~~(65)~~ the desired bit decision signal $\hat{a}(l)$ to the joint channel estimator module ~~(24)~~, further comprising ~~the steps of~~:

computing ~~(64)~~ a replica signal ~~(32)~~ calculated by a replica signal generation means ~~(30)~~ of the joint channel estimator module ~~(24)~~ as a convolution of the desired bit decision signal $\hat{a}(l)$ and a replica impulse response h_r of said replica signal generation means ~~(30)~~; and

generating ~~(66)~~ a residual signal \hat{r} by subtracting the replica signal ~~(32)~~ from the filtered waveform signal y using an adder ~~(44)~~.

3. (Currently Amended) The method of claim 2, wherein the interfering training sequence ~~(37)~~ and the interfering training sequence delay signal ~~(38)~~ are identified by calculating correlating signals of said residual signal \hat{r} with the candidate training sequences or training sequences convolved by a known transmission pulse shape for all possible bit positions; among said correlating signals, the maximum correlation signal is selected as interfering training sequence ~~(37)~~ and the corresponding timing position as the interfering training sequence delay signal ~~(38)~~ which are provided to the joint channel estimator ~~(40)~~.

4. (Original) The method of claim 1, wherein the interfering signals are asynchronous with a desired signal.

5. (Original) The method of claim 1, wherein the interfering signals are synchronous with a desired signal.
6. (Currently Amended) The method of claim 1, wherein the desired bit decision signal ~~$\hat{a}(t)$~~ consists partly comprises ~~of~~ a known training bit sequence signal.
7. (Currently Amended) The method of claim 1, after receiving ~~(60)~~ the radio signal by the receiver filter ~~(12)~~, further ~~comprising the steps of~~ comprises:
- computing ~~(62)~~ an initial desired impulse response estimate signal ~~\hat{h}_{CM}~~ using the filtered waveform signal ~~(y)~~ by a channel estimator ~~(22)~~ of a first stage ~~(14)~~ of the single antenna interference cancellation SAIC receiver (10); and
- computing ~~(64)~~ the desired bit decision signal ~~$\hat{a}(t)$~~ using the initial desired impulse response estimate signal ~~\hat{h}_{CM}~~ and the filtered waveform signal ~~(y)~~ by a single antenna interference cancellation ~~(SAIC)~~ detector ~~(20)~~ of the first stage ~~(14)~~ of the single antenna interference cancellation SAIC receiver (10).
8. (Currently Amended) The method of claim 7, wherein the channel estimator ~~(22)~~ is an iterative constant modulus ~~(CM)~~ channel estimator and single antenna interference cancellation SAIC detector ~~(20)~~ is a constant modulus single antenna interference cancellation ~~(CM-SAIC)~~ detector.

9. (Currently Amended) The method of claim 1, after the ~~step of said computing (72)~~ the desired impulse response estimate signal ~~$\hat{h}_{JCE}^{(1)}$~~ by the joint channel estimator ~~(24)~~, further comprising ~~the step of~~:

computing ~~(74)~~ a further desired bit decision signal ~~$\hat{a}(2)$~~ using the desired impulse response estimate signal ~~$\hat{h}_{JCE}^{(1)}$~~ and the filtered waveform signal ~~y~~ by a further single antenna interference cancellation SAIC detector ~~(20a)~~ of a second stage ~~(16)~~ of the single antenna interference cancellation SAIC receiver ~~(10)~~.

10. (Currently Amended) The method of claim 9, wherein the further desired bit decision signal ~~$\hat{a}(2)$~~ is an output signal of the single antenna interference cancellation SAIC receiver ~~(10)~~ ~~based generated using on~~ a predetermined criterion.

11. (Currently Amended) The method of claim 9, further comprising ~~the step of~~:

providing ~~(78)~~ the further desired bit decision signal ~~$\hat{a}(2)$~~ to a further joint channel estimator module ~~(24a)~~ of a third stage ~~(18)~~ of the single antenna interference cancellation SAIC receiver ~~(10)~~.

12. (Currently Amended) The method of claim 9, wherein the channel estimator ~~(22)~~ is an iterative constant modulus ~~(CM)~~ channel estimator and wherein the single antenna interference cancellation SAIC detector ~~(20)~~ and the further single antenna interference cancellation SAIC

detector ~~(20a)~~ are constant modulus single antenna interference cancellation ~~(CM-SAIC)~~ detectors.

13. (Currently Amended) A single antenna interference cancellation ~~(SAIC)~~ receiver ~~(10)~~ for suppression of interfering co-channel signals, both synchronous or asynchronous, by calculating a desired impulse response estimate signal ~~$(\hat{\mathbf{h}}_{JCE}^{(0)})$~~ , comprising:

a receiver filter ~~(12)~~ of the single antenna interference cancellation SAIC receiver (10), responsive to a radio signal ~~(11)~~, for providing configured to provide a filtered waveform signal (y);

a means ~~(14)~~ for providing configured to provide a desired bit decision signal $(\hat{\mathbf{a}}(1))$; and

a joint channel estimator ~~(24)~~ of the single antenna interference cancellation SAIC receiver (10), responsive to the filtered waveform signal ~~(y)~~, to the desired bit decision signal, $(\hat{\mathbf{a}}(1))$ and to an interfering training sequence signal ~~(37)~~ and an interfering training sequence delay signal ~~(38)~~ generated without prior knowledge of training sequence of the interfering co-channel signal, for providing configured to provide the a desired impulse response estimate signal $(\hat{\mathbf{h}}_{JCE}^{(0)})$,

wherein said single antenna interference cancellation receiver is for suppression of interfering co-channel signals, both synchronous and asynchronous.

14. (Currently Amended) The single antenna interference cancellation SAIC receiver (10) of claim 13, wherein the

means for providing a desired bit decision signal $\hat{a}(1)$ is a first stage (14) of the single antenna interference cancellation SAIC receiver (10), said first stage (14) comprises:

a channel estimator (22), responsive to the filtered waveform signal y , ~~for providing~~ configured to provide an initial desired impulse response estimate signal \hat{h}_{CM} ; and

a single antenna interference cancellation (SAIC) detector (20), responsive to the initial desired impulse response estimate signal \hat{h}_{CM} , configured to provide ~~for providing~~ the desired bit decision signal $\hat{a}(1)$.

15. (Currently Amended) The single antenna interference cancellation SAIC receiver (10) of claim 13, wherein the channel estimator (22) is an iterative constant modulus (CM) channel estimator and single antenna interference cancellation SAIC detector (20) is a constant modulus single antenna interference cancellation (CM-SAIC) detector.

16. (Currently Amended) The single antenna interference cancellation SAIC receiver (10) of claim 13, further comprising at least one more stage (16), responsive to the desired bit decision signal $\hat{a}(1)$ and to the filtered waveform signal y , configured to provide ~~for providing~~ a further desired bit decision signal $\hat{a}(2)$.

17. (Currently Amended) The single antenna interference cancellation SAIC receiver (10) of claim 16, wherein the

further desired bit decision signal ~~$\hat{a}(2)$~~ is an output signal of a further single antenna interference cancellation SAIC detector ~~(20a)~~ based on generated using a predetermined criterion.

18. (Currently Amended) The single antenna interference cancellation SAIC receiver ~~(10)~~ of claim 16, wherein said at least one more stage that is a second stage ~~(16)~~ comprises:

a further single antenna interference cancellation SAIC detector ~~(20a)~~, responsive to the desired impulse response estimate signal ~~$\hat{h}_{JCE}^{(1)}$~~ , configured to provide for ~~providing~~ the further desired bit decision signal ~~$\hat{a}(2)$~~ ; and

a joint channel estimator module ~~(24)~~, responsive to the desired bit decision signal ~~$\hat{a}(1)$~~ and to the filtered waveform signal ~~y~~ , configured to provide for ~~providing~~ the desired impulse response estimate signal ~~$\hat{h}_{JCE}^{(1)}$~~ .

19. (Currently Amended) The single antenna interference cancellation receiver ~~method~~ of claim 18, wherein the channel estimator ~~(22)~~ is an iterative constant modulus ~~(CM)~~ channel estimator and wherein the single antenna interference cancellation SAIC detector ~~(20)~~ and the further single antenna interference cancellation SAIC detector ~~(20a)~~ are constant modulus single antenna interference cancellation ~~(CM SAIC)~~ detectors.

20. (Currently Amended) The single antenna interference cancellation SAIC receiver ~~(10)~~ of claim 18, wherein said joint channel estimator module ~~(24)~~ comprises:

a replica signal generation means ~~(30)~~, responsive to the desired bit decision signal ~~($\hat{a}(t)$)~~, configured to provide ~~for providing~~ a replica signal ~~(32)~~ calculated by said ~~replica signal generation means (30)~~ as a convolution of the desired bit decision signal $\hat{a}(t)$ and a replica impulse response h_r of said replica signal generation means ~~(30)~~;

an adder ~~(44)~~, for providing a residual signal \hat{r} by subtracting the replica signal ~~(32)~~ from the filtered waveform signal ~~(y)~~;

a correlation means, responsive to the residual signal ~~(\hat{r})~~, configured to provide ~~for providing~~ the interfering training sequence ~~(37)~~ and its delay signal ~~(38)~~ identified by calculating correlating signals of said residual signal ~~(\hat{r})~~ with the candidate training sequences or training sequences convolved by a known transmission pulse shape for all possible bit positions; among said correlating signals, the maximum correlation signal is selected as the interfering training sequence signal ~~(37)~~ and the corresponding timing position as the interfering training sequence delay signal ~~(38)~~ which are provided to the joint channel estimator ~~(40)~~; and

a joint channel estimator ~~(40)~~, responsive to the filtered waveform signal ~~(y)~~, to the desired bit decision signal ~~($\hat{a}(t)$)~~, to the interfering training sequence signal ~~(37)~~ and to the interfering training sequence delay signal

~~(38)~~, configured to provide for providing the desired impulse response estimate signal $\hat{\mathbf{h}}_{JCE}^{(1)}$.

21. (Currently Amended) The single antenna interference cancellation SAIC receiver ~~(10)~~ of claim 16, further comprising at least one further stage ~~(18)~~, responsive to the further desired bit decision signal $\hat{\mathbf{a}}^{(2)}$ and to the filtered waveform signal ~~(y)~~, configured to provide for providing at least one further desired bit decision signal $\hat{\mathbf{a}}^{(3)}$.